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CHICAGO, IL 60606

EXAMINER

WOLVERTON, DAREN A

ART UNIT	PAPER NUMBER
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2813

NOTIFICATION DATE	DELIVERY MODE
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04/14/2010

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/574,186	Applicant(s) PRIBAT ET AL.	
	Examiner DAREN WOLVERTON	Art Unit 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 September 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 and 8-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 and 8-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 September 2009 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-5 and 8-25 are rejected under 35 U.S.C. 102(b) as being anticipated by anticipated by Iwasaki et al. (US PGPUB 2001/0028872) (Iwasaki hereinafter) as evidenced by Nakano et al. ("Effect of electrolysis factors...") (Nakano hereinafter).

Regarding claims 1, 5, and 15, Iwasaki discloses a method comprising: making (see FIG. 2) a nanoporous membrane 13 (specifically an anodized film, see paragraph [0055]) having a plurality of pores 14 (shown in FIG. 2, see paragraph [0055]) in a thin layer deposited (see paragraph [0112]) onto a single-crystal substrate 11 (see paragraph [0072]); depositing (see FIG. 18 and paragraph [0155]) a metal catalyst 201 (cobalt in paragraph [0155]) in and on (see below) the nanoporous membrane 13, the metal catalyst 201 suitable for penetrating into at least some of the pores 14 (see FIG.

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18) of the nanoporous membrane 13; growing (see paragraph [156] and FIG. 18) filamentary structures 202 (specifically carbon nanotubes) on the catalyst 201 in the least some of the pores 14 of the nanoporous membrane 13; wherein the nanoporous membrane 13 is prepared in a manner (anodization with pores opened to the underlying substrate 11, see paragraph [0057] and FIG. 2) suitable for ensuring that a wall of the pores 14 includes a single-crystal zone (at the bottom of the pore where it opens onto the substrate 11), and wherein at least some of the catalyst 201 is grown epitaxially on said single-crystal crystal zone (see below) and on at least a portion of the nanoporous membrane common to numerous pores (see below and FIG. 18).

Note that the electro-deposition method used to form the catalyst will inherently (see Nakano, page 47, lines 3-6) form at least some of the catalyst by epitaxial growth.

Regarding the limitations requiring that the deposition of the catalyst take place on the nanoporous membrane note that Iwasaki uses an electro-deposition (see paragraph [0155], paragraph [0081], and paragraph [0099]) or CVD method (see paragraph [0086]) which will inherently deposit material onto the base of the sidewalls nearest to bottom openings in the pores in the same manner as the applicant's electro-deposition or CVD method and thus Iwasaki inherently meets these limitations (see the response to arguments section below).

Regarding claim 2, Iwasaki, in paragraph [0068], discloses that the pores of the nanoporous membrane have a calibrated size.

Regarding claim 3, Iwasaki, in FIG. 2, discloses that the nanoporous membrane 13 is made in a manner suitable for ensuring that it extends substantially in a plane (the

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x-z plane in the figure, where the z-axis extends from the plane), and the pores 14 are made in a manner suitable for ensuring they are oriented substantially perpendicularly to the plane of the membrane.

Regarding claim 4, Iwasaki, in FIG. 2, discloses that the nanoporous membrane 13 is made in a manner suitable for ensuring that it extends substantially in a plane (the x-y plane in the figure), and the pores 14 are made in a manner suitable for ensuring they are oriented substantially parallel to the plane of the membrane.

Regarding claims 8 and 9, Iwasaki, in FIG. 8, FIG. 19, and paragraphs [0074] through [0076], discloses that a layer 81 (a layer of Pt, Pd, Ir, Rh, Os, Ru, or Ni) is made on the single-crystal substrate 82 (see paragraph [0076], note that Iwasaki describes both 82 and 81 as part of substrate 11), prior to transferring or depositing the thin layer 13 onto the single-crystal substrate 82 (see the figures and note that the layer must be deposited before layer 13). While not discloses as forming a diffusion barrier these materials will inherently reduce or prevent the diffusion of silicon into the cobalt by their mere presence (how much depends on the solubility of cobalt in the material and the thickness of the formed layer) and thus are inherently suitable for preventing the catalyst 201, at least in part, from being contaminated by the material constituting the substrate 81.

Regarding claim 10, Iwasaki, in paragraph [0155], discloses that the catalyst 201 is formed by electro-deposition (a synonym for electroplating).

Regarding claim 11, Iwasaki further discloses, in paragraph [0086], discloses that the nanoholes may be filled by CVD instead of electro-deposition.

Regarding claim 12, Iwasaki further discloses, in paragraph [0156], that the catalyst is annealed after deposition, the broadest reasonable definition of annealing being: 'heating and then cooling'.

Regarding claim 13, Iwasaki further discloses, in paragraph [0155], that the catalyst comprises cobalt, and therefore the annealing (of the cobalt catalyst) is inherently performed under a magnetic field since cobalt is ferromagnetic and thus possesses an internal magnetic field.

Regarding claim 14, Iwasaki, in paragraph [0002] and paragraph [0250], discloses that an electronic component is made on the nanoporous membrane.

Regarding claim 16, Iwasaki, in paragraph [0155], discloses that the catalyst is cobalt which is a transition metal.

Regarding claim 17, Iwasaki, in paragraph [0156], discloses that the filamentary structures are deposited by chemical vapor deposition.

Regarding claims 18 and 19, Iwasaki, in paragraph [0087], discloses an alternate embodiment of the invention in which silicon nanorods are formed from a gold catalyst as opposed to the cobalt catalyst 201 and the carbon nanotubes 202.

Regarding claim 20, note that the above described method of claim 1, creates a structure with all the limitations of this claim.

Regarding claim 21, Iwasaki further discloses, in FIG. 26 and paragraph [0233] through paragraph [0236], an embodiment (which still meets all the limitations of claims 1 and 20 as described in the cited paragraphs) in which a portion of the nanoporous membrane (the left half) constitutes an electrode (filaments 111 are conductive

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structures) enabling a voltage to be imparted to at least one filamentary structure deposited in another portion of the in another portion of the nanoporous membrane (the structures on the opposite side of the device, note that the whole thing effectively forms a FET).

Regarding claim 22, Iwasaki, in FIG. 19, discloses that the component lies on a substrate 82 and includes at least one filamentary nanoscale structure 202 extending parallel to a plane of the substrate 82 (specifically any of the planes perpendicular to the surface of the substrate).

Regarding claim 23, note that in the embodiment disclosed in FIG. 26 and paragraphs [0233] the filament structures 111 are electrodes that extend into the pores.

Regarding claim 24, note that the above described method of claim 15, creates a structure with all the limitations of this claim.

Regarding claim 25, note that the above described method of claim 18, creates a structure with all the limitations of this claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Iwasaki in view of Duet al. (CN 1278024, DERWENT entry and machine translation included) (Du hereinafter).

Regarding claim 6, Iwasaki discloses all of the limitations of claim 1, but does not disclose that the nanoporous membrane is made by the anodization of a single crystal substrate.

Du discloses a method of forming a large-area ordered nanometer template on a single-crystal aluminum substrate (NOVELTY portion of the DERWENT abstract). Du also discloses that using a single-crystal aluminum substrate removes the influence of grain boundaries on the product (see the 4th paragraph of the machine translation).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to form the nanoporous membrane of Iwasaki by anodic oxidation of a single crystal substrate.

One of ordinary skill in the art would be motivated to do this in order to remove the influence of grain boundaries on the aluminum oxide template.

Response to Arguments

Applicant's arguments, filed 09/04/2009, with respect to the objections to the drawings, the objections to the claims, and the rejection to claims 20-25 under 35 U.S.C. 112 have been fully considered and are persuasive. The objections to the drawings, the objections to the claims, and the rejection to claims 20-25 of the action dated 06/12/2009 have been withdrawn.

Applicant's arguments filed 09/04/2009 with respect to the rejection of claims 1-6 and 7-25 under art have been fully considered but they are not persuasive.

Regarding the applicant's argument that the reference of Iwasaki does not disclose the formation (through electro-deposition or CVD) of the catalyst on the side walls, note that the Iwasaki discloses the same methods (electro-deposition or CVD) as the applicant, and thus it is inherent that the methods will result in deposition on the sidewalls in the same manner as the applicants invention (please note that FIG. 12B and FIG. 17 of Iwasaki are formed by sputtering or evaporation not CVD or electro-deposition).

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., the well controlled orientation and chirality of the nanotubes/nanowires/nanorods) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Specifically, in addition to the previously cited references:

Den et al. (US 6,628,053) which discloses a method of creating nanofilamentary structures by depositing a catalyst in anodized aluminum templates, wherein insulating materials may be deposited both before and after template formation.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DAREN WOLVERTON whose telephone number is (571) 270-5784. The examiner can normally be reached on Monday to Thursday from 9:30 a.m. to 3:00 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Landau can be reached on (571) 272-1731. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. W./
Examiner, Art Unit 2813

/Matthew C. Landau/
Supervisory Patent Examiner, Art
Unit 2813

DW